



PROLIFERATED DRONES

A Perspective on France

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Introduction

France has a long history of using drones. One of the very first drones – the remote-controlled World War I-era Voisin 8 biplane tested in 1917 – was French. Today, drones of all sizes are used in both domestic and foreign operations. While unarmed drones are used exclusively for intelligence, surveillance, and reconnaissance (ISR) as a complement to manned platforms, there is a debate emerging over the possible weaponization of the American-built, French-operated MQ-9 Reapers used in Operation Barkhane.¹ By 2025 France will likely possess an unmanned combat air vehicle (UCAV), which is necessarily armed, to deploy in denied airspaces in combination with Rafale jet fighters. However, in acquiring and deploying drones, France is facing several financial, human resource, public perception, and cultural constraints.

Technology

France is developing and using drones in almost all conceivable categories:

Civilian and hobbyist: The French leisure drone market is booming, with 100,000 units – led by French company Parrot – sold in 2014 for a revenue of €300 million.² The professional drone market is smaller but very promising as well, with 1,500 companies authorized to fly drones in various sectors (agriculture, energy, transportation, industrial inspection, etc.) as of January 2016.³ Firefighters and police forces also use small drones (e.g., Novadem NX110).

Small-size military: Special forces, both army and air force, possess minidrones (e.g., the Israeli Elbit Skylark 1 and 1-LE, the French Dracula and Thales Spy Arrow, the U.S. AeroVironment Wasp). The army has deployed French Survey Copter/Cassidian DRACs in Afghanistan (2010-2012) and Mali (since 2013) as well as three French Infotron DroGen units used by army engineers against improvised explosive devices.



Military tactical: The army has been using tactical drones for 50 years and has a strong expertise in these systems.⁴ Currently, it possesses around 20 French Sagem (Safran) SDTI Sperwers, eight of which flew in Afghanistan for a total of more than 2,000 hours in 800 missions. As successor to the SDTI, the Sagem Patroller was finally selected over the Watchkeeper WK450 (developed by the

French company Thales UK from an Israeli Elbit Hermes 450 made for the British army). Fourteen of the Patrollers will be delivered to the French army in 2018. The navy sees drones as a complement to its manned helicopters for the “3D jobs” (dull, dirty, dangerous). It tested the Austrian Schiebel Camcopter S-100, which it calls Serval, on the patrol vessel L'Adroit and is seeking to acquire a tactical heli-drone in the 700- to 2,000-kilogram category. The navy could additionally need medium-altitude long-endurance (MALE) remotely piloted aircrafts (RPAs) with specific sensors, such as maritime surveillance radar and an automatic identification system receptor.⁵ The navy also intends to develop a system of tactical aerial drones for the marines (SDAM) by 2020.

MALE: France and Europe are particular latecomers to this category. The four French EADS Harfangs (modified Israeli IAI Herons) did not enter service in the air force until summer 2008. The August 2008 Uzbini Valley ambush, in which France had 10 soldiers killed and 21 wounded, accelerated the deployment of Harfangs in Afghanistan (2009-2011), even before the end of the system's test phase. Based in Bagram, the French drones were used not only in support of French troops but also for the International Security

Assistance Force (ISAF) and other countries (the United States, Norway, Poland, Germany, etc.). Their deployment in the extremely vast zones of Libya (2011) and Mali (2013) proved that speed was critical – a capability that the aging Harfangs lack.

The Harfangs – joined by three MQ-9 Reaper Block-1s (two in December 2013, the third in May 2015) – were additionally engaged in Operation Serval in Mali and are still deployed for Operation Barkhane in the Sahel-Saharan strip. With more than 5,000 flight hours in only 18 months, France flew its first two Reapers “more than any other customer,” as Frank Pace, CEO of General Atomics Aeronautical Systems, acknowledged.⁶ The results were impressive, as the drones supported operations that eliminated numerous terrorist leaders and freed hostages. The French air force will receive nine more Reapers by 2019, Block-5s. For now, all French drones are operated on the ground in the Sahel, but the second system – which should be delivered in 2016 with more remotely piloted aircrafts (RPAs) – will be deployed in Cognac, France, for “reach-back” or remote split operations. Also, the French air force would like to add a signals intelligence (SIGINT) capability to its Reapers that will have to be acquired in the United States.

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Furthermore, to end Europe’s reliance on Israeli and U.S. drones, the French, German, and Italian ministers of defense agreed in May 2015 to a two-year study on a new generation of MALE “Euro-drone.”⁷ Involving three European corporations, Dassault, Airbus, and Leonardo, the resulting drone will be designed to fly in both Europe and overseas by 2025 and avoid the inefficiencies that arose from the simultaneous development of three rival European fighters (the Dassault Rafale, Eurofighter Typhoon, and Saab Gripen).

These future MALEs will be fully integrated in a “combat cloud” system⁸ that will allow them to be linked to manned aircraft, such as the Rafale, and unmanned aircraft, such as the projected UCAV.⁹ It is not yet clear whether the new drones will be armed.

HALE: France has no high-altitude long-endurance (HALE) drones by choice, as it has deemed the cost/performance ratio inadequate. In the 2017 to 2018 time frame, however, NATO will have RQ-4 Global Hawks at the Sigonella air base in Italy.¹⁰

UCAV: With Dassault as the prime contractor, France is the leader of the European technology demonstrator nEUROn, which made its first flight on December 1, 2012, and completed its first phase (a 100-flight test campaign in France) in February 2015. With the British Taranis, developed by BAE Systems, it serves as a study for the French-Anglo Future Combat Air System (FCAS) development program. The FCAS will be built by Dassault and BAE, with Rolls-Royce and Safran motors, and will be equipped with Thales and Selex ES sensors and electronics. A demonstrator is expected in 2017.

HAPS: In the relatively new category of high-altitude pseudo-satellites (HAPS), there are two noteworthy projects: the Airbus Defence & Space Zephyr 8 and the Thales Alenia Space StratoBus aerostat. These platforms are able to fly for months (five years, in the case of StratoBus) and will fill the gap between the MALE – or even HALE – RPAs and satellites. They will “find” targets, while the MALE will “fix, track, and engage” them.

Space-launcher: Eole (developed by the French aerospace lab Onera) is a reduced-scale (1/4) prototype that has been in testing since 2013 to study “the feasibility of replacing the first stage of a conventional launch vehicle by an automated, reusable launch aircraft.” It is “designed to orbit nanosatellites (from 10 to 50 kg) quickly and at moderate cost.”¹¹

Strategic Implications

ISR and Strikes

Currently, France is using drones only for ISR missions. Specifically, these operations include intelligence preparation of the battlefield, supporting conventional and special operation troops in contact during engagements, monitoring suspected jihadists, and finding or rescuing hostages.

In current air force doctrine, unarmed MALE Harfangs and Reapers complement fighter jets, armed helicopters, or any system capable of delivering a precision strike. In Niamey,

they are paired with two Mirage 2000Ds and two Mirage 2000Cs as well as with the Rafales based in N'djamena that conduct the strikes. Fighter pilots insist on the added value of working with drones. When scrambled to assist troops in contact, for example, they first examine drone images to learn the geographical situation. RPAs can also lase targets for the fighters or maritime patrol aircraft (Atlantique 2).

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Arming the currently unarmed French Reapers is controversial.¹² The objective of doing so would be to cover the entire kill chain (find, fix, track, target, engage, assess). There is also a humanitarian argument that arming the drones would save time and therefore increase discrimination. While conducting strikes is not a priority – because more is learned from capturing the target – when the mission is to strike, it can currently only be conducted by manned aircraft. In the time needed for the aircraft to arrive in the zone, however, the target could have moved into an environment where the risk of collateral damage is far higher.

Targets

Before arming its drones, France must consider what kinds of targets and military operations they would be used for. Armed Reapers would be used against the same non-state targets France is fighting today with unarmed drones and fighter jets in the Sahel. Being missile-fitted surveillance drones, armed Reapers are slow, not stealthy, and relatively not maneuverable. Therefore, they can only be used in permissive airspace. In the future, UCAVs will be able to penetrate hostile or denied airspace and could therefore be used against state targets without the need to first destroy enemy integrated air defense systems. The dichotomy between non-state and state actors will be blurred when non-state actors acquire strong anti-aircraft capabilities. In the unlikely event that ISIS were to acquire – and be able to operate – an S-300 advanced surface-to-air missile system,

for example, it would be much more difficult for MALEs, such as the Reaper, or other air assets to operate safely.

Missions

France is already using drones for all kinds of missions: short-range missions within its own borders, cross-border operations into neighboring countries' territories, longer-range regional or global missions, and expeditionary operations.

Domestically, some companies are using small drones to survey strategic infrastructure and will use larger drones to fly over linear infrastructure (railways, pipes, electrical communication). For now, the Harfang is the only MALE in the French air force inventory allowed to fly over the national territory, and it is used for high-profile events (e.g., national day parade in Paris, high-level official visits). The current contract with the United States confines the Reaper to the Sahel, but there are discussions of introducing it into French airspace. Using MALE drones within France's borders and for cross-border operations would be useful for monitoring migration flows in the Mediterranean Sea, drug traffickers, potential transnational terrorists, national parks, and forest fires. They could also support helicopters deployed in response to a terrorist attack. Launched and piloted from the Cognac Air Base, they could be operational anywhere in France within a few hours.¹³ The MALE, operated by either the navy or the air force, could also complement the French navy for maritime patrolling.¹⁴ France has the second-largest exclusive economic zone in the world and insufficient manned means to patrol such a huge area.¹⁵

Perceptions

How will France perceive drones compared with traditional human-inhabited aircraft? Lacking an internal pilot, drones have two main characteristics: Their persistence provides real-time knowledge, and the crew's physical separation reduces risk (but, contrary to a widespread belief, does not totally suppress risk as French drones were operated in situ from Bagram, Afghanistan, and currently are operated from Niamey, Niger – not to mention the direct risk to launch & recovery and technical teams). The first characteristic is why French drones already perform new operations, compared with traditional human-inhabited aircraft, with their ISR persistence providing superior

information for a lower cost in external operations.

Drones have not yet reduced risk, at least for the air force, which is still using traditional human-inhabited aircraft for higher-risk operations. The French air force is not inclined to take more risks with its drones for at least two reasons. First, the current MALEs can only be deployed in permissive, low-risk airspace. Second, with only three Reapers today and nine more planned in the coming years, France is reluctant to place its “new toys” in harm’s way.

Therefore, France is no more willing to deploy a drone in a contested area than a traditional human-inhabited aircraft. The UCAVs will change this in the future, as they will be specifically designed to penetrate and survive in such areas. However, this does not mean that France will always use a UCAV rather than a traditional human-inhabited aircraft. France is working on combination scenarios in which UCAVs are used to saturate the airspace while Rafales penetrate it at very low altitude.

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In general, France disproves the presumption that a state is always more likely to accept risk with a drone than with a human-inhabited aircraft, because it depends on external factors such as cost, the number of available units, and the strategic and political context. For the same reason, the deployment of French MALE drones does not signal greater or lesser resolve than does use of traditional human-inhabited aircraft. It signals only a requirement; they are deployed where no human-inhabited aircraft can do the same job.

Threats

On the national territory, the proliferation of hobbyist systems is concerning. France, like

other countries, is affected by flights over restricted government areas (e.g., Elysée presidential palace and nuclear facilities). For now, such flights are interpreted as harming the credibility of the authorities more than a real threat, but the possibility of disruptive employment by non-state actors of weaponized hobbyist systems in the future is taken seriously.

The probability of others sending MALE or HALE drones into France's territory is very low. Only France's allies have flown drones into its airspace with its consent during military exercises (an American Global Hawk and an Italian Reaper in 2014). Air defenses would quickly shoot down any unauthorized intrusion, particularly if the drone was thought to be armed.

Outside the national territory and in regions where France operates militarily, France's allies – the United States and the United Kingdom – are most likely to send drones. Maintaining air superiority in all its current external operations – in the Sahel-Saharan strip, Iraq, and the Central African Republic – France is not threatened by foreign drones as long as persistent air or ground radar coverage is maintained. Small drones operated by non-state actors, such as ISIS, are used for propaganda and do not constitute a serious threat.

Non-state actors do not yet possess the technology, such as scramblers, to deny or disrupt France's use of drones, but it is only a matter of time before they do. Securing satellite communications should thus be a priority. In Niamey and other deployment sites, the greatest risk now for a MALE RPA is to be shot down during takeoff and landing.

Constraints

In the acquisition and/or use of drones, France currently or potentially faces the following constraints:

Financial: With an unlimited budget, France would obviously acquire and develop many more drone systems. However, the financial constraints also present an opportunity for expanded drone use, due to the cost-effectiveness as compared with human-inhabited aircraft.



Political: France's commitment to an independent foreign policy heightens issues of sovereignty. The Reapers' efficiency is widely acknowledged, but a minority of politicians and journalists denounce a triple dependency: (1) Lacking simulators, French pilots are only trained in the United States in competition with the United States' own needs. Moreover, French Block-1 Reapers have been

launched by U.S. General Atomics (GA) contractors during takeoff and landing (since January 2016, the French Air Force is now authorized to take over, but will first need to train its pilots); (2) Only GA can fix and replace the spare parts, which could be an additional constraint; and (3) Conditions of use are fixed by the American Congress, meaning that France needs the consent of Washington to deploy its Reapers. Also, there is a risk that America's position regarding French deployment could become less flexible in the future. Such criticism should be put into perspective, as focusing exclusively on the Reapers is unfair since French forces use a number of other foreign pieces of equipment, including the Harfang, E-3F AWACS, E-2C Hawkeye, guided bomb unit (GBU) bombs, and even the Charles de Gaulle aircraft carrier catapults. Secondly, France accepted these restrictions when it chose to acquire the U.S. version of the Reapers – a privilege it shares only with the United Kingdom – and to avoid waiting for the Block-5 export variant in 2017. France has become the United States' first strategic partner in the war on terror, so this alliance is crucial. As for GA, its professionalism and reactivity have already proved decisive on several occasions.

Human resources: MALE drones require substantial personnel ("there is nothing more manned than an 'unmanned' system," Col. Fontaine has often said), and France needs more pilots, sensor operators, and intelligence specialists. In addition, these personnel must be kept motivated. They are real air force fighter pilots being required to "feel" the air even from the ground, have sharp anticipation and coordination capabilities, and make quick decisions. For a minority of pilots who can no longer fly fighter jets for health reasons, drones present an opportunity to stay operational, although pilots still often miss flying "real" planes.¹⁶ A solution would be to buy more light surveillance aircraft, not only to complement the drones and cover all ISR needs but also to allow the pilots to fly in order to maintain their qualifications.

Public perception: France is not directly affected by the global (and mostly American) debate on armed drones and targeted killings, but as it considers arming its Reapers, it

must address such concerns. This debate has already raised concern in the European Parliament, which is “seriously preoccupied by the use of armed drones outside the framework of international law,” and worries the French public. The debate is largely due to a conflation of armed drones and the CIA’s use of them (the “Chamayou syndrome”) and to a conflation of armed drone and autonomous lethal weapon systems (the “Terminator syndrome”).¹⁷

Military ethics culture: Resistance is both external (public opinion) and internal, because within the armed forces there is a cultural split between at least two military ethics: the virtue ethics of those, often in the army, who valorize physical courage and are uncomfortable with remotely waging war; and the consequentialism of those, often in the air force or the navy, accustomed to fighting remotely – or at least further at a farther remove from the enemy.

Conclusion

France firmly believes in drones. Alone or with European partners, it has a number of different drone projects for its air force, army, and navy. Its future platforms will be more connected with on-board sensors via the combat cloud, and they will critically require more bandwidth. In the next 10 to 20 years, drones will not replace human-inhabited aircraft for ISR or combat missions, but they will work together with greater integration.

Disclaimer: The views, opinions, and positions expressed by the author in this article are his alone and do not necessarily reflect the views, opinions, or positions of the French Ministry of Foreign Affairs.

Author’s note: I am grateful to several government sources, especially Colonel Christophe “Tarazboulba” Fontaine, for data and discussions. Fontaine, a former commander of the French air force’s 1/33 Belfort drone squadron, flew the French MALEs in Afghanistan, Libya, Mali, Niger, and the Sahel-Saharan strip.



Response: Israel Perspective

By Uri Sadot

France's country report offers a thorough account of the state of its UAV development. It touches on the distant as well as recent history of its local industries, while listing its current capabilities, inventories, and plans for future force structure.

The report is of particular interest to an Israeli reader as both countries share a long aeronautical past. Until the late 1960s, France was Israel's main military supplier, with Israel's air force relying chiefly on French-made planes. While France remains an industrial aeronautical power today, it has been "behind the curve" in the development of indigenous drone capabilities. For that reason, it operates imported unmanned systems, chiefly from the United States and Israel.

The author describes in France a "firm belief in drones" and lists the multiyear plans to improve the country's unmanned fleet. He estimates a five- to 10-year timeline for fruition, either by independent development or in concert with other European states. For Israel, from a purely commercial standpoint, having a five- to 10-year lead on competition is a valuable asset. From a broader strategic viewpoint, however, a militarily capable Europe is beneficial for Israel's security, creating a tension between competing goals.

In reading the report, some differences of perspective are particularly surprising. For example, France does not appear to consider state or state-like organizations as significant threats. While Israel strives to develop versatile capabilities superior to those of nearby state actors, France's existing fleet is mainly used for "softer" missions such as patrolling its territorial waters, firefighting, drug traffic interdiction, refugee flow monitoring, etc. The military uses, it seems, center on non-state actors in French spheres of influence and

interest.

Also striking was to read of France's political objections to reliance on foreign technology, cited as a constraint to drone procurement and operation. By relying on America for its heavy platforms, Israel freed resources to develop cutting-edge drone technology, munitions, and avionics. France, in contrast, heavily invests in indigenous platforms (Rafale fighter aircraft, submarines, aircraft carriers), hampering its ability to innovate elsewhere. Yet, Israel maintains an independent foreign policy despite such procurements and largely considers its relationship with America a source of pride, and not of constraint.

In conclusion, both Israel and France stand to gain from collaborative engagement by learning from each other's experiences and by developing tools against common threats such as al Qaeda or ISIS. This informative report provides a valuable steppingstone in that direction.

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Endnotes

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- [http://www.defense.gouv.fr/actualites/international/operation-barkhane-point-de-situation-du-8-janvier-2015/\(language\)/fre-FR#SearchText=operationbarkhane#xtcr=1](http://www.defense.gouv.fr/actualites/international/operation-barkhane-point-de-situation-du-8-janvier-2015/(language)/fre-FR#SearchText=operationbarkhane#xtcr=1).
2. Hassan Meddah, "Drones : le marché français atteindrait 300 millions d'euros en 2015," *Usinenouvelle.com*, March, 10 2015, <http://www.usinenouvelle.com/editorial/drones-le-marche-francais-atteindrait-300-millions-d-euros-en-2015.N318416>.
 3. Fabienne Schmitt, "Le marché prometteur des drones professionnels," *LesEchos.fr*, January, 9 2016, <http://www.lesechos.fr/tech-medias/hightech/021606274429-le-marche-prometteur-des-drones-professionnels-1190984.php>.
 4. Fabrice Jaouen, "Le drone tactique : élément de la puissance militaire," *Revue Défense Nationale*, 731 (2010), 103.
 5. Lionel Chauprade, *Les Drones Aériens* (Paris: Cepaduès Éditions, 2014), 96-98.
 6. "Public remarks," Frank Pace (Cognac Air Base, Chateaubernard, France, June 18, 2015).
 7. "Joint statement by the Ministers of Defence of the Federal Republic of Germany, Ursula von der Leyen, of the Italian Republic, Roberta Pinotti; and of the French Republic, Jean-Yves Le Drian, on the European MALE UAV initiative," French Ministry of Defence, press release, May 18, 2015, <http://www.defense-aerospace.com/article-view/release/163728/html>.
 8. The French air force is developing this concept, on the presumption that the future combat system will not be a plane or a platform but will rely on command, control, communications, computers, information/intelligence, surveillance, targeting, acquisition, and reconnaissance (C4ISR) and a "cloud" that Gen. D. Mercier, then-chief of staff of the French air force, described as "a system of systems integrating sensors and effectors of various natures and generations." Gen. D. Mercier, "Les drones: un changement de paradigme pour les opérations" (Institut des Hautes Etudes de Défense Nationale, May 4, 2015), <http://www.ihedn.fr/?q=content/les-drones-un-changement-de-paradigme-pour-les-op%C3%A9rations>.
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11. Onera: The French Aerospace Lab, "Eole," <http://www.onera.fr/en/focus/eole?destination=node/1621>.
 12. J.-B. Jeangène Vilmer, "When France Arms its Drones," *The French Air Force: Transforming to Prepare for the Future, Les Cahiers de la Revue Défense Nationale, Paris Air Show 2015 special issue* (June 2015), 96-101.
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 14. Colonel C. Fontaine, *Les grands drones : une nouvelle arme contre les flibustiers du 21e siècle* (M.A. thesis, University Paris Panthéon-Assas, 2008), <http://www.drmmc.org/spip.php?article330>.
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 16. Jean-Philippe Louis, "Drones militaires : branle-bas de combat chez les futurs pilotes," *Le Parisien Magazine* (February 20, 2014), <http://www.leparisien.fr/magazine/grand-angle/drones-militaires-branle-bas-de-combat-chez-les-futurs-pilotes-20-02-2014-3608991.php>.
 17. The most fundamental criticism that can be made about Gregoire Chamayou's *A Theory of the Drone* (New York: The New Press, 2015) is that his theory mistakes its target – or is mistitled – for this is not a book on, or even against, the drone. It is a book against the American policy of targeted killings, with the drone as a means. This is a very widespread point of confusion: The drone is the subject of a heated debate today largely because of its use by the CIA in Waziristan, and to a lesser extent in Yemen and Somalia – a policy that is of course debatable, but to which "the drone" should not be reduced. See J.-B. Jeangène Vilmer, "An Ideology of the Drone," BooksandIdeas.net, November 6, 2014, www.booksandideas.net/An-Ideology-of-the-Drone.html. Lethal autonomous weapons systems, often called "killer robots," are theoretically able to target and fire with neither human supervision nor interference. They have already generated great debate, launched by nongovernmental organizations (NGOs) and the U.N. special rapporteur on extrajudicial, summary or arbitrary execution, who demand a preventive ban. Armed drones are remote-controlled – a human pulls the trigger – and therefore should not belong to this category, but some NGOs generate confusion among the public about the difference between the "evil" killer robots of science fiction and

existing remote-controlled armed drones. This miscategorization, the “*Terminator syndrome*,” propagates misinformation and should be resisted. See J.-B. Jeangène Vilmer, “Terminator Ethics: Should We Ban ‘Killer Robots’?,” *Ethics & International Affairs* (March 23, 2015), www.ethicsandinternationalaffairs.org/2015/terminator-ethics-ban-killer-robots.

Image Credits

French UCAV Sagem Patroller and Sagem Sperwer (or SDTI) at the Paris Air Show 2009: Photo via commons.wikimedia.org

BAGRAM AIR FIELD, Afghanistan – An Unmanned Aerial Vehicle, from the French UAV Squadron, waits to be flown, here July 11. The French UAV is very similar to the U.S. Predator MQ-1 UAV: USAF Photo by Senior Airman Felicia Juenke via commons.wikimedia.org



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